

High-pressure melting of wüstite

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ABSTRACT

Iron oxide (FeO) is an important component in the mineralogy of Earth's lower mantle and possibly its core, so its phase diagram is essential to models of the planet's interior. The melting curve of wüstite, Fe_{0.94}O, was determined up to 77 GPa and 3100 K in a laser-heated diamond anvil cell. Melting transition temperatures were identified from discontinuities in the emissivity vs. temperature relationship within the laser-heated spot. The melting curve exhibits no obvious kinks that could be related to a subsolidus transition in wüstite, but there is evidence for a two-phase loop at pressures below 30 GPa. Comparison of these results to previous studies on Fe, Fe-O, and Fe-S confirms that the melting point depression in the Fe-O system remains significantly less, by a factor of 2 or more, than that in the Fe-S system up to pressures exceeding 80 GPa.

Keywords: High pressure, wüstite, phase equilibria, multispectral imaging radiometry